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Dr. Tijana Rajh has extensive experience in the synthesis and study of colloidal semiconductor nanocrystals. She conducted some of the earliest research on quantum dots, a scientific area that has grown enormously and is of great current interest and impact. She authored one of the first three papers ever written about colloidal quantum dots (1985). From 1981–1994, Dr. Rajh studied electron transfer reactions in colloidal semiconductors (photoelectrochemistry) and solar energy conversion into chemical fuels. She has been a staff member of the Argonne Chemistry Division since 1996, working on surface modification of nanocrystalline TiO_2 nanoparticles for light induced metal sequestration, deposition of metallic nanocircuits, and integration with biomolecules.

Current Research:

- Surface modification of small semiconductor nanoparticles for electronic coupling of nanoparticles with surrounding environment. Modifying the surface of metal oxides with enediols on nanoscale was found to result in their tunable optical properties.
- Chelating ligands act as *conductive leads* that allow electronic linking of the nanoparticle into molecular circuits. This unique hybrid system (TiO_2/enediol) provides a means to attach selective functionalities that will lead to development of highly specialized light induced nanomachines.
- A method to control and initiate chemical reactions of DNA strands, DNA binding proteins and antibodies was developed using novel hybrid nanometer-sized metal oxide semiconductors.
- The effect of surface modification on structural, dynamic and redox properties was investigated by HRTEM and XAS spectroscopies, electron paramagnetic resonance (EPR), and pulse radiolysis, respectively. Optimal conditions for binding and remediation of various inorganic and organic pollutants in the presence of surface modifiers was also investigated.